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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Rec'd PCT/PTO 17 DEC 2004

Applicant's or agent's file reference P0758	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB 03/02414	International filing date (day/month/year) 03.06.2003	Priority date (day/month/year) 20.06.2002
International Patent Classification (IPC) or both national classification and IPC A61G5/06		
Applicant MILLS, Christopher James et Al.		

1. This International preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 12 sheets.
3. This report contains indications relating to the following items:
 - I Basis of the opinion
 - II Priority
 - III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV Lack of unity of invention
 - V Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI Certain documents cited
 - VII Certain defects in the international application
 - VIII Certain observations on the international application

Date of submission of the demand 19.01.2004	Date of completion of this report 13.10.2004
Name and mailing address of the International preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Cametz, C Telephone No. +31 70 340-3434



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB 03/02414

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1, 8-11, 13	as originally filed
4, 7, 12	received on 14.07.2004 with letter of 14.07.2004
2, 3, 5, 6	received on 05.10.2004 with letter of 05.10.2004

Claims, Numbers

1-21	received on 05.10.2004 with letter of 05.10.2004
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Drawings, Sheets

1/6-66	as originally filed
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2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.:
- the drawings, sheets:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB 03/02414

5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).
(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-21
	No: Claims	
Inventive step (IS)	Yes: Claims	1-21
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-21
	No: Claims	

2. Citations and explanations

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB 03/02414

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following document:

D1: WO 94/15567 A (LIGTVOET PRODUCTS BV ;VORST ARNOLDUS MARINUS JOHANNE (NL)) 21 July 1994 (1994-07-21)

2. Document D1, which is considered to represent the most relevant state of the art, discloses (see page 2, lines 9 to 24, page 3, lines 3 to 5, page 4, lines 2 to 15, page 5, lines 10 to 28, and figures 1 to 3; the references in parentheses applying to this document):

A wheeled conveyance comprising a chassis, support means for a load mounted on the chassis, a suspension assembly mounted on the chassis and comprising suspension arms pivotally mounted on the chassis and extending in forward and rearward directions in the region of opposite sides of the chassis, each suspension arm having a wheel rotatably mounted at the free end thereof, and two separate spring means, one disposed in the region of each side of the chassis, the free ends of the forwardly and rearwardly extending suspension arms being arranged to tend to pivot towards each other by means of the two separate spring means being provided between, and acting on the forwardly and rearwardly extending suspension arms; and two shock absorber means separately cooperating between the chassis and each of the suspension arms extending in the forward direction,

from which the subject-matter of claim 1 differs in that

the two shock absorber means are provided in a substantially horizontal plane so as to limit and dampen tilting of the chassis relative to at least part of the suspension assembly under dynamic load conditions tending to produce such tilting whilst upward and downward movement of the wheels with the suspension arms is substantially uninhibited thereby in the absence of tilting motion of the chassis.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB 03/02414

The problem to be solved by the present invention may be regarded as providing an arrangement of chassis, suspension arms, spring means and shock absorber means, which is able more effectively to inhibit lateral movement of the chassis without inhibiting the vertical movement of the wheels with the suspension arms.

The present invention solves this problem (as claimed on claim 1) by providing two shock absorber means, separately cooperating between the chassis and each of the suspension arms extending in the forward direction, in a substantially horizontal plane.

Hence the subject-matter of claim 1 involves an inventive step and meets the requirements of Article 33(3) PCT.

3. Claims 2 to 21 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.
4. The wheeled conveyance disclosed in claims 1 to 21 is industrially applicable and therefore meets the requirements of Article 33(4)PCT.

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result in overturning of the wheelchair, particularly when descending a slope. The problem is exacerbated by the fact that such wheelchairs have a relatively short wheelbase and a relatively high centre of gravity. In 5 some situations the height of the centre of gravity is increased by heavy batteries, which are used to power the wheelchair, being mounted in the chassis beneath the seat.

10 The problem is exacerbated with a wheelchair incorporating a suspension assembly which permits the load to tilt forward, thereby enabling the centre of gravity to move marginally forward also.

15 Problems in reverse arise with non-powered push-chairs and wheelchairs with suspension when the chair is tilted backwards to effect steering or to mount a large obstacle. Downwards pressure on the pushing handle must take up suspension movement before the front wheels lift 20 off the ground. This is less precise than for a rigid chair.

It is an object of the present invention to overcome or minimise these problems.

25 According to the present invention there is provided a wheeled conveyance comprising: a chassis; support means for a load mounted on the chassis; a suspension assembly mounted on the chassis and comprising suspension arms 30 pivotably mounted on the chassis and extending in forward and rearward directions in the region of opposite sides of the chassis, each suspension arm having a wheel

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rotatably mounted at the free end thereof, and two separate spring means, one disposed in the region of each side of the chassis, the free ends of the forwardly and rearwardly extending suspension arms being arranged to 5 tend to pivot towards each other by means of the two separate spring means being provided between, and acting on, the forwardly and rearwardly extending suspension arms; and two shock absorber means separately cooperating between the chassis and each of the suspension arms 10 extending in the forward direction, wherein the two shock absorber means are provided in a substantially horizontal plane so as to limit and dampen tilting of the chassis relative to at least part of the suspension assembly under dynamic load conditions tending to produce such 15 tilting whilst upward and downward movement of the wheels with the suspension arms is substantially uninhibited thereby in the absence of tilting motion of the chassis.

The wheels mounted at the free ends of one of the 20 forwardly extending and rearwardly extending suspension arms may be adapted to swivel about swivel means, for example about a generally upright axis, such as independently of one another.

25 The wheels provided with swivel means may be provided with limiting means permitting swivelling through a predetermined limited range.

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The wheeled conveyance may be self-propelled or may be non-powered.

5 The self-propelled wheeled conveyance may comprise a motorised wheelchair, having a support means comprising a seat, and a load such as a person to be transported.

10 Where the wheeled conveyance is self-propelled, the wheels mounted at the free ends of the suspension arms extending in the rearward direction may each be motor-driven and the wheels mounted at the free ends of the suspension arms extending in the forward direction may be provided with swivel means adapted to allow the wheels to swivel.

15 Alternatively, the wheels mounted at the free ends of the suspension arms extending in the forward direction may each be motor-driven and the wheels mounted at the free ends of the suspension arms extending in the rearward direction may be provided with swivel means adapted to allow the wheels to swivel.

25 The motor-driven wheels may be powered by separate motors, which may be electric motors, which may be powered by one or more batteries which may be mounted on the chassis.

30 A manually-operated controller, such as a joystick, may be provided for controlling the motors whereby motion and steering of the conveyance is controlled.

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The two shock absorber means may be provided with adjustment means to effect a desired extent of limitation of the tilting of the chassis.

5 The two shock absorber means may be provided with adjustment means adapted to substantially minimise tilting of the chassis.

Each of the two shock absorber means may be of elongate
10 telescopic form, having one end thereof pivotably secured to the chassis and an opposite end thereof pivotably secured to the associated forwardly extending suspension arm or to a strut extending upwardly from the associated forwardly extending suspension arm. Each of the two
15 shock absorber means of elongate telescopic form may be adapted to pivot during corresponding pivoting of its associated forwardly extending suspension arm.

The two shock absorber means may be arranged to operate
20 simultaneously and collectively to limit the forward tilting of the chassis, with each shock absorber means acting independently on its associated forwardly extending suspension arm.

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For a better understanding of the present invention and to show more clearly how it may be carried into effect, reference will now be made, by way of example, to the accompanying drawings in which:

5

Figure 1 is a side view of an embodiment of a self-propelled wheeled conveyance according to the present invention, in the form of a motorised wheelchair;

10 Figure 2 is a top plan view of the self-propelled wheeled conveyance of Figure 1;

Figure 3 is an end view of a chassis for use in the self-propelled wheeled conveyance of Figures 1 and 2;

15

Figure 4 is a side view of another embodiment of a self-propelled wheeled conveyance according to the present invention, in the form of a motorised wheelchair;

20 Figure 5 is a top plan view of the self-propelled wheeled conveyance of Figure 4;

Figure 6 is a side view of an embodiment of a chassis forming part of a non-powered wheeled conveyance;

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Figure 7 is a top plan view of the wheeled conveyance chassis of Figure 6; and

Figure 8 is an end view of the wheeled conveyance chassis 5 of Figures 6 and 7.

Referring to Figures 1, 2 and 3, a motorised wheelchair 2 has a tubular metal chassis 4, which is shown in detail in Figure 3, on which is secured a seat 6 for supporting 10 a person to be transported in the wheelchair.

A suspension assembly is mounted on the chassis 4 and comprises two suspension arms 8 pivotably mounted at ends 10 thereof on lower portions 12 of T-shaped brackets 14 provided at opposite sides of the chassis 4. The 15 suspension arms 8 extend in a forward direction and have ground-engaging wheels 16, rotatably mounted and arranged to swivel about a generally upright axis, at free ends 18 thereof.

20 Two further suspension arms 20 are pivotably mounted at ends 22 thereof on upper portions 24 of the T-shaped brackets 14 at opposite sides of the chassis 4. The suspension arms 20 extend in a rearward direction and 25 have ground-engaging wheels 26 rotatably mounted at free ends 28 thereof. Each wheel 26 is independently driven by a separate electric motor 30 mounted on each of the suspension arms 20.

30 The electric motors 30 are energised by one or more batteries (not shown) mounted on the chassis 4, such as

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The shock absorbers 38 act in exactly the same way as those previously described with reference to Figures 1 and 2, to minimise forward tilting movement of the chassis 4 in the direction of arrow 36, such as when 5 power to the motors 30 is interrupted and the wheelchair 2 comes to an abrupt halt, or when the wheelchair 2 descends a gradient, or drops over a kerb or into a pothole.

10 Figures 6, 7 and 8 show an embodiment of a chassis of a non-powered push-chair or wheelchair. The push-chair or wheelchair chassis 2 in Figures 6 to 8 differs from that of Figures 1 to 3 in that the wheels are not swivelable and the shock absorber 38 is mounted in an upright 15 configuration.

In Figures 6, 7 and 8, parts fulfilling the same or similar functions as those in Figures 1, 2 and 3 are given the same reference numerals as those in Figures 1, 20 2 and 3.

Accordingly, the wheeled conveyance shown in Figures 6 to 8 has a tubular metal chassis 4 adapted to receive a seat (not shown) for supporting an infant or person to be 25 transported. A seat or other support means can readily be mounted on the chassis 4 in a manner similar to that shown in Figures 1, 3 and 4.

A suspension assembly is mounted on the chassis 4 and 30 comprises two suspension arms 8 pivotably mounted at ends 10 thereof at opposite sides of the chassis 4. The suspension arms 8 extend in a forward direction and have wheels 16 rotatably mounted at free ends 18 thereof.

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CLAIMS

1. A wheeled conveyance (2) comprising: a chassis (4); support means for a load mounted on the chassis (4); a suspension assembly mounted on the chassis (4) and comprising suspension arms (8, 20) pivotably mounted on the chassis (4) and extending in forward and rearward directions in the region of opposite sides of the chassis (4), each suspension arm having a wheel (18, 28) rotatably mounted at the free end (18, 28) thereof, and two separate spring means (32), one disposed in the region of each side of the chassis (4), the free ends (18, 28) of the forwardly and rearwardly extending suspension arms (8, 20) being arranged to tend to pivot towards each other by means of the two separate spring means (32) being provided between, and acting on, the forwardly and rearwardly extending suspension arms (8, 20); and two shock absorber means (38) separately cooperating between the chassis (4) and each of the suspension arms (8, 20) extending in the forward direction, characterised in that the two shock absorber means (38) are provided in a substantially horizontal plane so as to limit and dampen tilting of the chassis (4) relative to at least part of the suspension assembly under dynamic load conditions tending to produce such tilting whilst upward and downward movement of the wheels (16, 26) with the suspension arms (8, 20) is substantially uninhibited thereby in the absence of tilting motion of the chassis (4).
2. A wheeled conveyance as claimed in claim 1, characterised in that the wheels (16, 26) mounted at the free ends (18, 28) of one of the forwardly extending and rearwardly extending suspension arms (8, 20) are provided

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with swivel means arranged such that the wheels (19, 26) are adapted to swivel independently of one another.

3. A wheeled conveyance as claimed in claim 1 or 2,
5 characterised in that the wheels (16, 26) mounted at the free ends (18, 28) of one of the forwardly extending and rearwardly extending suspension arms (8, 20) are provided with swivel means arranged such that the wheels (19, 26) are adapted to swivel about a generally upright axis.

10 4. A wheeled conveyance as claimed in claim 2 or 3, characterised in that the wheels (16, 26) provided with swivel means are further provided with limiting means permitting swivelling through a predetermined limited
15 range.

5. A wheeled conveyance as claimed in any preceding claim, characterised in that the wheeled conveyance is non-powered.

20 6. A wheeled conveyance as claimed in any one of claims 1 to 4, characterised in that the wheeled conveyance is self-propelled.

25 7. A wheeled conveyance as claimed in claim 6, characterised in that the self-propelled wheeled conveyance comprises a motorised wheelchair, having a support means comprising a seat (6).

30 8. A wheeled conveyance as claimed in claim 6 or 7, characterised in that the wheels (16) mounted at the free ends (28) of the suspension arms (20) extending in the rearward direction are each motor-driven and the wheels (26) mounted at the free ends (18) of the suspension arms

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(8) extending in the forward direction are provided with swivel means adapted to allow the wheels (26) to swivel.

9. A wheeled conveyance as claimed in claim 6 or 7,
5 characterised in that the wheels (26) mounted at the free ends (18) of the suspension arms (8) extending in the forward direction are each motor-driven and the wheels (16) mounted at the free ends (28) of the suspension arms (20) extending in the rearward direction are provided
10 with swivel means adapted to allow the wheels (16) to swivel.

10. A wheeled conveyance as claimed in claim 8 or 9,
characterised in that the motor-driven wheels are powered
15 by separate motors (30).

11. A wheeled conveyance as claimed in claim 10,
characterised in that the separate motors are electric
motors (30).

20 12. A wheeled conveyance as claimed in claim 11,
characterised in that the electric motors (30) are
powered by one or more batteries.

25 13. A wheeled conveyance as claimed in claim 12,
characterised in that the one or more batteries are
mounted on the chassis (4).

14. A wheeled conveyance as claimed in any one of claims
30 8 to 13, characterised in that a manually-operated
controller is provided for controlling the motors (30)
whereby motion and steering of the conveyance is
controlled.

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15. A wheeled conveyance as claimed in claim 14,
characterised in that the manually-operated controller is
a joystick.

5 16. A wheeled conveyance as claimed in any preceding
claim, characterised in that the two shock absorber means
(38) are provided with adjustment means to effect a
desired extent of limitation of the tilting of the
chassis (4).

10 17. A wheeled conveyance as claimed in any preceding
claim, characterised in that the two shock absorber means
(38) are provided with adjustment means adapted to
substantially minimise tilting of the chassis (4).

15 18. A wheeled conveyance as claimed in any preceding
claim, characterised in that each of the two shock
absorber means (38) are of elongate telescopic form,
having one end (40) thereof pivotably secured to the
20 chassis (4) and an opposite end (44) thereof pivotably
secured to the associated forwardly extending suspension
arm (8).

25 19. A wheeled conveyance as claimed in any one of claims
1 to 17, characterised in that each of the two shock
absorber means (38) are of elongate telescopic form,
having one end (40) thereof pivotably secured to the
chassis (4) and an opposite end (44) thereof pivotably
secured to a strut (46) extending upwardly from the
30 associated forwardly extending suspension arm (8).

20. A wheeled conveyance as claimed in claim 18 or 19,
characterised in that the pivotably secured ends (40, 44)
of each of the two shock absorber means of elongate
35 telescopic form are adapted to pivot during corresponding

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pivoting of its associated forwardly extending suspension arm (8).

21. A wheeled conveyance as claimed in any preceding
5 claim, characterised in that the two shock absorber means
(38) are adapted to operate simultaneously and
collectively to limit the forward tilting of the chassis
(4), with each shock absorber means acting independently
on its associated forwardly extending suspension arm (8).